

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:	) Atty. Docket No.: <b>SAMBO0006</b>
Keiichiro OISHI	) Confirmation No.: 6259
	)
Serial No. 10/529,804	) Group Art Unit: 1793
	)
Filed: March 30, 2005	)
	) Examiner: SIKYIN IP
For: HEAT RESISTANCE COPPER	)
ALLOY MATERIALS	)

**DECLARATION OF KEIICHIRO OISHI UNDER 37 C.F.R. § 1.132**

Sir:

1. I, Keiichiro OISHI, the inventor in the above-captioned case, state that I am an expert in the field of metal alloy research and development. Specifically, I am the head of the Research and Development Department at the Sambo Plant of Mitsubishi Shindoh Co., Ltd., 8-374, Sambo-cho, Sakai-ku, Sakai-shi, Osaka, Japan, 590-0906 (hereafter, the “Sambo R&D Department”).

2. I am familiar with the above captioned application and claims. Furthermore, I am familiar with Japanese Patent Application No. JP 10-130754 (hereafter, the JP’754 Document”), as I am a co-inventor of the subject matter disclosed by the JP’754 Document. I have also reviewed the official Office Action, dated May 15, 2008, regarding the above-captioned application.

3. In this declaration, I submit testimony and experimental evidence demonstrating that the subject matter disclosed by the JP’754 Document does not render obvious the subject

matter recited by independent claim 1 of the above captioned patent application, and that the “Official Notice” given by the Examiner on page 3, lines 23-24, of the Office Action dated May 15 2008, is factually inaccurate.

**General Testimony Regarding the JP’754 Document**

4. As co-inventor of the subject matter of the JP’754 Document, I know that the JP’754 Document discloses a “heat resistant copper base alloy,” wherein the heat resistant copper base alloy contains, by weight, 0.10 to 1.0% Co, 0.10 to 1.0% Sn, 0.02 to 0.20% P, 0.01 to 2.0% Zn, and the balance Cu with inevitable impurities, and if required, one or two kinds of elements selected from 0.05 to 0.7% Ni, 0.05 to 0.5% Fe, 0.01 to 0.30% Mn and 0.005 to 0.10% Mg added thereto (See Patent Abstracts of Japan corresponding to JP’754 Document). The JP’754 Document discloses various sample alloys as shown in Table 1 of the JP’754 Document.

5. As co-inventor of the subject matter of the JP’754 Document, I know that the JP’754 Document does not disclose metal alloys falling within the class of metal alloys recited by independent claim 1 of the present application.

**Experimental Evidence Showing that the JP’754 Document Does Not Render Obvious the Subject Matter of Claim 1 of the Above-captioned Application**

6. To show that the subject matter disclosed by the JP’754 Document does not render obvious the invention as recited by independent claim 1 of the above-captioned application,

the following experimental results were collected and are the product of tests lead by me and conducted under my supervision or discretion at the Sambo R&D Department.

7. The present experiment consisted of making ingots of metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 from Table 1 of the JP'754 Document, which are all alloys that do not require Ni or Fe. The presently claimed invention, as recited by claims 1, 3, 5-13, 15, 25-28, 33 and 34, does not require Ni or Fe. Therefore, it is my expert opinion that metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 represent the closest prior art with regard to the subject matter recited by claim 1 of the above-captioned application.

8. The relationships of  $[\text{Co}]-0.02)/[\text{P}]$  and  $[\text{Co}]+0.5[\text{P}]+0.9[\text{Sn}]+0.1[\text{Zn}]$  were determined based on the elemental composition for each of the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document, and the results are compiled in a Table along with elemental compositions of the corresponding metal alloys, attached hereto as "Exhibit A." Each of the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document underwent a standardized test to determine thermal conductivity in units of  $\text{cal}/\text{cm}\cdot\text{sec}\cdot^{\circ}\text{C}$ . The test used to determine thermal conductivity of the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document is the same test used to test thermal conductivity reported in Tables 8-11 of the above-captioned application. Prior to measuring thermal conductivity for metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document, each of these metal alloys underwent the same heat treatment as alloys of the present invention, namely, heating at  $800^{\circ}\text{C}$  for 10 minutes followed by cooling at a rate of  $20^{\circ}\text{C}/\text{min}$ .

9. As shown in the Table of Exhibit A, none of the specific metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document had an elemental composition falling within the scope of the invention recited by independent claim 1. Furthermore, none of the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document had a value for the relationship  $[\text{Co}] + 0.5[\text{P}] + 0.9[\text{Sn}] + 0.1[\text{Zn}]$  that fell within the claimed range of 0.20 to 0.54 (See Claim 1 of the above-captioned application).

10. With respect to the property of thermal conductivity ( $\text{cal/cm}\cdot\text{sec}\cdot^{\circ}\text{C}$ ), each of the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document failed to exhibit a value for thermal conductivity higher than  $0.57 \text{ cal/cm}\cdot\text{sec}\cdot^{\circ}\text{C}$  as recited by claim 33 of the above-captioned application. Alloys of the present invention, however, exhibit this characteristic as shown by Tables 5 to 8 of the specification of the above-captioned application. In other words, alloys in accordance with the present invention, have a thermal conductivity value similar to that of between pure aluminum to pure copper (See Specification of above-captioned application, page 11, lines 11-21). Based on my knowledge of the alloys of the JP'754 Document, and based on the test results compiled in Exhibit A, I believe that a person of ordinary skill in the art would conclude that the alloys disclosed by the JP'754 Document are not alloys in accordance with the present invention, as recited in claims 1 and 33, because the alloys of the JP'754 Document do not exhibit sufficient thermal conductivity.

11. In my expert opinion, and based on my knowledge and experience in the art, the results tabulated in Exhibit A demonstrate that the metal alloys disclosed by the JP'754 Document are not alloys in accordance with the present invention because (i) they do not

explicitly meet the elemental composition recited by independent claim 1, (ii) they do not satisfy the relationship  $0.20 \leq [\text{Co}] + 0.5[\text{P}] + 0.9[\text{Sn}] + 0.1[\text{Zn}] \leq 0.54$  as recited by independent claim 1, and (iii) they exhibit substantially lower values for thermal conductivity than alloys of the present invention (See, e.g., claim 33). As co-inventor of the subject matter of the JP'754 Document, and as an expert in the relevant art, I believe a person of ordinary skill in the art would not have been able to predict, based on the prior art of record, that alloys in accordance with claim 1 of the above-captioned application, would have substantially superior thermal conductivity over metal alloys disclosed in the JP'754 Document. Therefore, it is my expert opinion that the substantially improved thermal conductivity characteristics exhibited by alloys in accordance with claim 1 of the present invention is an unexpectedly superior result over the metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document. With respect to the limitation recited by claim 33, wherein "thermal conductivity...is higher than 0.57 cal/cm·sec·°C," this is another feature in accordance with the present invention that is not taught, or suggested, by alloys of the JP'754 Document as shown by Exhibit A.

**The Examiner's "Official Notice" is Erroneous**

12. With respect to claim 6 of the above-captioned application, which recites "wherein 0.2% proof stress is higher than or equal to 55 N/mm<sup>2</sup> after a brazing treatment or a heat treatment under the same condition as said brazing treatment," I understand that the Examiner admits that the JP'754 Document does not disclose the claimed range of 0.2% proof stress (Office Action, dated May 15, 2008, at 3, lines 22-23). However, I understand that the Examiner contends "[i]t is known in the art of cited reference yield strength is about 80% of ultimate tensile strength" (Office Action, dated May 15, 2008, at 3, lines 23-24). I

understand that when an Examiner makes an assertion regarding subject matter the Examiner believes is common knowledge in the art, the Examiner may take "Official Notice" and allege that the asserted facts are true even though the Examiner produces no substantial support for the asserted facts, such as a patent or other printed publication.

13. The Examiner's "Official Notice" is erroneous for the following reasons.

14. In my expert opinion, a person of ordinary skill in the art would know that tensile strength and yield stress for a copper alloy drop to a lower value when the copper alloy is heated (See, e.g., Specification of the above-captioned application, at 1, line 23, to 2, line 8). The 0.2% yield strength is defined, in accordance with the invention, after brazing or other equivalent heat treatment has been performed (See, e.g., claim 6). Thus, in accordance with the embodiment recited by claim 6 of the above-captioned application, heat treatment is conducted under the same conditions as brazing. As recited by claim 34, "the brazing treatment comprises treatment of the alloy material at 800°C for 10 minutes followed by cooling at a rate of 20°C per minute." Based on personal experience in the art, I know that a heat treatment at a temperature of 800°C is much higher than the commonly-used temperature of 300-600°C used for annealing. Therefore, a person of ordinary skill in the art would instantly realize that yield stress would be substantially lower for a copper alloy material subjected to temperatures of a brazing treatment, which is conducted at about 800°C, than for annealed copper alloy material, which is subjected to annealing temperatures of only about 300-600°C.

**Exhibit B Shows that Yield Strength Should be Much Less than 80% of Tensile Strength**

15. Exhibit B (Data Sheet No. A 6 Cu-DHP, Consel International Pour Le Developpement Du Cuivre, pp. 1, 2 and 4 (1968)), attached hereto, pertains to phosphorus-deoxidized copper (high residual phosphorus). Thus, Exhibit B discloses properties of copper alloy (i.e., deoxidized copper) containing 0.013-0.050% phosphorus, by weight. Exhibit B discloses, at 2, Section 3, annealing conducted in the temperature range of 250-650°C. According to the data compiled in the Table on page 4 of Exhibit B, tensile strength is 22 kg/mm<sup>2</sup> (i.e., approximately 220 N/mm<sup>2</sup>) for a plate and a rod, while yield stress is 5 kg/mm<sup>2</sup> (i.e., approximately 50 N/mm<sup>2</sup>) for the same structures. Exhibit B also discloses in the Table on page 4 that tensile strength is 24 kg/mm<sup>2</sup> (i.e., approximately 240 N/mm<sup>2</sup>) for a tube, while yield strength is 6 kg/mm<sup>2</sup> (i.e., approximately 60 N/mm<sup>2</sup>) for the same structure. Exhibit B thus supports the conclusion that yield stress is less than 25% of tensile strength for phosphorus-deoxidized copper, at least for the case of phosphorus deoxidized copper. Yield stress tends to lower as temperature to which the alloy is exposed rises, as I discussed above. Therefore, the percentage difference between yield stress and tensile strength should be even greater for the case of copper alloy material of claim 1, which contains a high amount of phosphorus, than for copper alloys in general. This is particularly true given the higher temperatures employed for brazing copper alloy material of the present invention than for annealing such alloys.

16. Exhibit B thus shows that the Examiner's "Official Notice" with respect to yield strength being 80% of tensile strength is not a true relationship for all metals, such as

phosphorus-deoxidized copper. Because the copper alloy material of the present invention also contains a relatively high amount of phosphorus, person of ordinary skill in the art would expect the yield stress of such a metal alloy to be substantially less than 80% of the tensile strength, and is likely to be substantially less than 25% of the tensile strength.

Exhibit B thus shows that the Examiner's alleged yield stress-tensile strength relationship between yield strength and tensile strength is not likely to be true for an alloy of the present invention, which contains a high amount of phosphorus.

**Exhibit C Shows that Yield Strength May be as Low as 11% of Tensile Strength**

17. Exhibit C (Copper Parts Data Book, pages 88 and 94 (1997)), attached hereto, is further evidence that the Examiner's Official Notice is erroneous. Exhibit C contains data pertaining to softening characteristics of copper alloy. In the graphs shown on pages 88 and 94 of Exhibit C, the vertical axis corresponds to yield stress and the horizontal axis corresponds to temperature.  $\sigma_b$ ,  $\sigma_{0.2}$ , and  $\delta$  represent curves of tensile strength, yield stress, and elongation, respectively. As evident from Exhibit C, tensile strength and especially yield stress decrease at the temperature range of 200-300°C, while elongation increases. As temperature increases, tensile strength and yield stress continue to drop. As shown in Figure 5.4-28 on page 94 of Exhibit C, tensile strength and yield stress are 260 N/mm<sup>2</sup> and 50 N/mm<sup>2</sup>, respectively, for the condition of 500°C for 30 minutes. Thus, in my opinion, Exhibit C demonstrates a similar relationship between tensile strength and yield stress as shown by Exhibit B in that yield stress is about 19% that of the tensile strength. In addition, when the temperature rises to 800°C (for 30 minutes), tensile strength and yield strength drop to 220 N/mm<sup>2</sup> and 25 N/mm<sup>2</sup>, respectively, according to Exhibit C. Exhibit C



supports the conclusion that yield stress decreases to as low as 11% that of the tensile strength, at least in the case of annealed copper alloy material heat treated at 800°C.

### **Conclusions**

18. In my expert opinion, when the data submitted in Exhibits A, B and C, attached hereto, is properly analyzed as explained above, they support the following conclusions:

- (a) Copper metal alloys, as disclosed by the JP'754 Document, are not copper alloy materials in accordance with independent claim 1 of the above-captioned application because the closest alloys of the JP'754 Document to those of the claimed invention are metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14, none of which have elemental compositions falling within the claimed range, and none of which satisfy the relationship  $0.20 \leq [\text{Co}] + 0.5[\text{P}] + 0.9[\text{Sn}] + 0.1[\text{Zn}] \leq 0.54$ ;
- (b) Copper metal alloys, as disclosed by the JP'754 Document, are not copper alloy materials in accordance with independent claim 1 of the above-captioned application because the closest alloys of the JP'754 Document to those of the claimed invention are metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14, and these JP'754 Document alloys exhibit substantially lower values for thermal conductivity than alloys of the present invention;
- (c) The fact that copper alloys of the above-captioned application exhibit substantially improved thermal conductivity values over those of metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document could not have been predicted by the prior art; therefore, the substantial improvement in thermal

conductivity exhibited by the copper alloy material in accordance with claim 1 of the above-captioned application is an unexpected, superior result;

- (d) The thermal conductivity of metal alloy Nos. 1, 2, 3, 4, 12, 13 and 14 of the JP'754 Document does not fall within the range of "higher than 0.57 cal/cm·sec·°C" as recited by claim 33 of the above-captioned application; and
- (e) The Examiner's assertion that it is "known in the art," to persons of ordinary skill in the art, that yield strength is 80% that of tensile strength for copper metal alloys is a false allegation because, as shown by Exhibit B, substantial evidence shows that for at least some phosphorus-containing copper alloys yield strength may be only 25% or less of tensile strength and, as shown by Exhibit C, substantial evidence shows that following a heat treatment at about 800°C, the yield strength of a copper alloy may be only 11% that of the tensile strength.

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19. I declare under penalty of perjury that the foregoing is true and correct, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed by,

Date: September 14, 2008

Keiichiro Oishi  
Keiichiro OISHI